

# Copper Interconnects Challenges

## IC Interconnect

- A metal line which acts as a wire inside integrated circuits to connect various components
- Types: 1. Global Interconnect  
2. Local Interconnect.

## Copper Interconnects

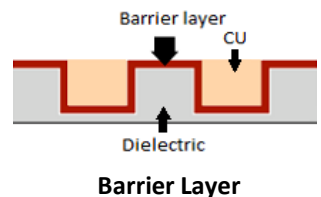
- **Metal Deposition**
  - Physical vapor deposition (PVD)
  - Chemical vapor deposition (CVD)
  - Electroplating
- **Advantages**
  - Low Resistivity ( $\rho$ ).
  - Reduced RC Delay.
  - Low Electromigration.

## Challenges

- **Copper Diffusion**

**Problem:** Copper diffusion into dielectric.

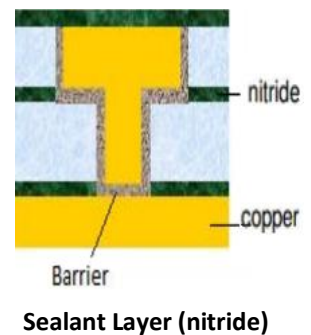
**Solution:** Create Barrier layer



- **Copper Oxidation**

**Problem:** Oxidation reduces copper interconnects reliability.

**Solution:** Create sealant layer.



- **Electrochemical Migration:**

- Short circuit formation between interconnects under DC bias.
- Due to:
  - Continuous moisture.
  - Two biased conductors.
  - Sealing defects.